

Preliminary Amendment
U.S.S.N. 10/621,079
Page 4 of 15

IN THE CLAIMS:

No amendments to the claims are being made at this time. The following claim listing shows all claims with "original" status.

CLAIM LISTING:

1. (Original) A process to produce a predictive data set which can be used to predict the property of a plating solution, said process comprising:
 - (a) obtaining a sample set, wherein each sample comprises a plating solution of good performance;
 - (b) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;
 - (c) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;
 - (d) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set; and
 - (e) validating said training data set to produce said predictive data set for a predictive model.
2. (Original) A process of claim 1 wherein said property is selected from the group consisting of:
 - a concentration of individual component of said electroplating bath;
 - an amount of breakdown products accumulated in said electroplating bath;
 - an amount of foreign contaminants accumulated in said electroplating bath;
 - a temperature of said electroplating bath;
 - a quantity of hysteresis on recorded voltammogram;
 - or combinations thereof.

Preliminary Amendment
U.S.S.N. 10/621,079
Page 5 of 15

3. (Original) A process of claim 1, wherein said property comprises an overall plating performance.
4. (Original) A process of claim 3, wherein said overall plating performance is selected from the group consisting of:
throwing power;
brightness of the deposit;
tensile strengths of the deposit;
ductility of the deposit;
internal stress of the deposit;
solderability performance;
resistance to thermal shock;
uniformity of the deposit;
capability of uniform filling through holes;
capability of filling submicron features in a substrate surface;
or combinations thereof.
5. (Original) A process according to claim 1, wherein said plating solution is an electroplating bath.
6. (Original) A process of claim 5, wherein said electroplating bath comprises a plating bath of one or metal selected from the following group: Cu, Sn, Pb, Zn, Ni, Ag, Cd, Co, Cr, and/or their alloys.
7. (Original) A process according to claim 1, wherein said plating solution is an electroless plating bath.

Preliminary Amendment
U.S.S.N. 10/621,079
Page 6 of 15

8. (Original) A process of claim 7, wherein said electroless plating bath comprises an autocatalytic plating bath of one or metal selected from the following group: Cu, Sn, Pb, Ni, Ag, Au, and/or their alloys.
9. (Original) A process of claim 7, wherein said electroless plating bath comprises an immersion plating bath of one or metal selected from the following group: Cu, Sn, Pb, Ni, Ag, Au and/or their alloys.
10. (Original) A process according to claim 1, wherein said plating solution is selected from the group consisting of:
- an electrowinning bath;
 - an electrorefining bath;
 - an electropolishing bath;
 - an electroforming bath; or
 - an electromicromachining bath.
11. (Original) A process of claims 10, wherein said electroplating bath comprises a plating bath of one or metal selected from the following group: Cu, Sn, Pb, Zn, Ni, Ag, Cd, Co, Cr, and/or their alloys.
12. (Original) A process of claim 1, wherein the sample set of step (a) comprises plating solutions of known concentration within specification range.
13. (Original) A process according to claim 1, wherein the sample data set of step (a) is obtained by design of experiment (DOE) routines.

Preliminary Amendment
U.S.S.N. 10/621,079
Page 7 of 15

14. (Original) A process according to claim 13, wherein said DOE routine is multicomponent multilevel linear orthogonal array.
15. (Original) A process according to claim 13, wherein said DOE routine is multicomponent multilevel fractional factorial.
16. (Original) A process of claim 1, wherein the sample set of step (a) comprises freshly prepared electroplating solutions of known concentration within specification range.
17. (Original) A process of claim 1, wherein said sample set of step (a) comprises industrial plating solutions with well performance (empirical sample set).
18. (Original) A process according to claim 1, wherein the electroanalytical response of step (b) is obtained by DC Voltammetry.
19. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC cyclic Voltammetry.
20. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Linear Scan Voltammetry.
21. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Anodic Stripping Voltammetry.
22. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Cathodic Stripping Voltammetry.

Preliminary Amendment
U.S.S.N. 10/621,079
Page 8 of 15

23. (Original) A process of claim 18, wherein the DC Voltammetry comprises DC Adsorptive Stripping Voltammetry.

24. (Original) A process of claim 19, wherein the DC Voltammetry comprises DC Cyclic Voltammetric Stripping technique.

25. (Original) A process according to claim 1, wherein the electroanalytical response of step (b) is obtained by a technique selected from the group consisting of:

DC Staircase Voltammetry;
Normal Pulse Voltammetry;
Reverse Pulse Voltammetry;
Differential Pulse Voltammetry;
Square Wave Voltammetry;
AC Voltammetry;
Chronoamperometry;
Chronopotentiometry;
Electrochemical Impedance Spectroscopy technique;
Polarographic techniques;
or combinations thereof.

26. (Original) A process according to claim 1, wherein said electroanalytical response of step (b) comprises a plurality of data points.

27. (Original) A process according to claim 1, wherein said electroanalytical response of step (b) is a combination of one or more portions of a complete electroanalytical response.

Preliminary Amendment
U.S.S.N. 10/621,079
Page 9 of 15

28. (Original) A process according to claim 1, wherein said electroanalytical response of step (b) comprises a combination of one or more portions of independent electroanalytical responses.

29. (Original) A process of claim 1, wherein said decomposition method of step (d) is selected from the group of:

Principal Component Analysis (PCA);
calculation of Mahalanobis Distance (MD);
calculation of Mahalanobis Distance with residuals (MDR);
calculation by Simple Modeling of Class Analogy (SIMCA);
calculation of F² ratio;
internal validation;
external validation;
and combinations thereof.

30. (Original) A process to predict the property of said plating solution, said process comprising:
(a) producing a predictive data set, the predictive data set generated by:
(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;
(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;
(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;
(a4) preprocessing of said electroanalytical response data set;
(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;

Preliminary Amendment
U.S.S.N. 10/621,079
Page 10 of 15

- (a6) validating said training data set to produce said predictive data set for a predictive model; and
- (b) using said predictive data set to predict the property of said plating solution, said property predicted by:
 - (b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;
 - (b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;
 - (b3) preprocessing of said electroanalytical response data set; and
 - (b4) applying said predictive model to predict property of each said unknown sample.

31. (Original) A process to detect faulty performance of said plating solution, said process comprising:
- (a) producing a predictive data set, the predictive data set generated by:
 - (a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;
 - (a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;
 - (a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;
 - (a4) preprocessing of said electroanalytical response data set;
 - (a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;
 - (a6) validating said training data set to produce said predictive data set for a predictive model; and
 - (a7) specifying the limits of good and faulty performance of said plating solution; and

Preliminary Amendment
U.S.S.N. 10/621,079
Page 11 of 15

(b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;

(b3) preprocessing of said electroanalytical response data set;

(b4) applying said predictive model to predict property of each said unknown sample;

and

(b5) qualifying said unknown samples as correct or faulty.

32. (Original) A method of monitoring performance of plating solution in order to perform controlled feed and bleed procedure, said process comprising the steps of:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(a4) preprocessing of said electroanalytical response data set;

(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;

(a6) validating said training data set to produce said predictive data set for a predictive model;

(a7) defining the limits of said property for said plating solution that requires feed and bleed procedure; and

Preliminary Amendment
U.S.S.N. 10/621,079
Page 12 of 15

(b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;

(b3) preprocessing of said electroanalytical response data set;

(b4) applying said predictive model to predict property of each said unknown sample; and

(b5) qualifying said unknown samples as a ready or not ready solution for feed and bleed procedure.

33. (Original) A method of monitoring performance of electroplating solution in order to perform controlled purification treatment procedure, said process comprising the steps of:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance;

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set;

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set;

(a4) preprocessing of said electroanalytical response data set;

(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;

(a6) validating said training data set to produce said predictive data set for a predictive model; and

Preliminary Amendment
U.S.S.N. 10/621,079
Page 13 of 15

- (a7) defining the limits of said property for said plating solution that requires purification treatment; and
- (b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:
 - (b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution;
 - (b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set;
 - (b3) preprocessing of said electroanalytical response data set;
 - (b4) applying said predictive model to predict property of each said unknown sample; and
 - (b5) qualifying said unknown samples as a ready or not ready for purification treatment.

34. (Original) A method of monitoring of performance of measuring system in order to detect its malfunctioning, said process comprising the steps of:
- (a) producing a predictive data set, the predictive data set generated by:
 - (a1) obtaining a training set, wherein each sample comprises an electronic characteristic of a measurement system of good performance;
 - (a2) preprocessing of said training data set;
 - (a3) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set;
 - (a4) validating said training data set to produce said predictive data set for a predictive model; and
 - (a5) defining the limits of said property for said electronic characteristic of the well performed measurement system; and
 - (b) using said predictive data set to predict the malfunctioning of measurement system said process comprises:

Preliminary Amendment
U.S.S.N. 10/621,079
Page 14 of 15

- (b1) obtaining a second data set, wherein each sample comprises an a periodically taken electronic characteristic of a measurement system;
- (b2) preprocessing of said second data set;
- (b3) applying said predictive model to predict property of each sample of a second data set; and
- (b4) detecting malfunctioning of measurement system by qualifying said property as a fault.

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